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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,822	08/25/2003	Hiroshi Okazaki	241806US3X	1809

22850 7590 11/29/2006

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EXAMINER

ECHELMAYER, ALIX ELIZABETH

ART UNIT PAPER NUMBER

1745

DATE MAILED: 11/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/646,822

Applicant(s)

OKAZAKI ET AL.

Examiner

Alix Elizabeth Echelmeyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date 8-23-06.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This Office Action is in response to Applicants' amendments filed September 18, 2006. Claims 1, 3, 9 and 10 have been amended. Claims 15-17 have been added. Claims 1-17 are pending and are rejected finally for the reasons given below.

Claim Objections

2. Claim 1 is objected to because of the following informalities: it appears that "at least any one of" should have been removed, or struck through, instead of added, as indicated by the underline. Appropriate correction is required.
3. Claim 6 is objected to because of the following informalities: "the third heat exchanger" should be "a third heat exchanger" or "wherein a third heat exchanger" should be "further comprises a third heat exchanger". Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dickman et al. (US Patent 6,465,118) in view of Okamoto (US Patent 6,045,933) and Wattelet et al. (US Patent 6,824,906).

Dickman et al. teach a thermal energy recovery system for use in a fuel processing system for a fuel cell using a heat exchange system. The heat exchange fluid undergoes several passes through different heat exchangers. Dickman et al. teach the use of water as the heat exchange fluid if there is a concern that metal ions would be introduced to the stack and storage of the water in a tank within the heat exchange reservoir (abstract; column 4 lines 27-67; column 5 lines 1-33, 43-63).

With regard to claim 13, Dickman et al. further teach the use of plate-type heat exchangers using water that can be recycled (column 3 lines 33-38).

Dickman et al. fail to teach the use of the heat exchanger to dehumidify the fuel inlet stream.

Okamoto teaches dehumidifying the fuel inlet if the moisture level in the fuel cell stack is sufficient. Okamoto teaches that the fuel inlet stream passes through a heat exchanger containing a coolant medium such as water (column 8 lines 37-53).

As for claim 7, Okamoto teaches the use of a radiator for cooling water (column 3 lines 9-18).

It would be desirable to use the heat exchanger of Dickman et al. to remove moisture from the fuel inlet stream if the moisture level in the fuel cell stack is sufficient as taught by Okamoto.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the heat exchanger of Dickman et al. to remove moisture from the fuel inlet stream if the moisture level in the fuel cell stack is sufficient as taught by Okamoto.

Dickman et al. in view of Okamoto fail to teach a laminated heat exchanger to house at least three heat exchangers, each to dehumidify inlet or outlet gases of the fuel cell.

Wattelet et al. teach a heat exchanger that includes a cathode exhaust condenser and a fuel cell stack cooler in side-by-side arrangement cooled by a common airstream (column 1 lines 44-65). Wattelet et al. further teach that this system provides increased compactness, reduction in cost because fewer parts are required, and simplified mounting. Also, the common coolant stream increases efficiency and minimizes space required (column 5 lines 49-67).

Regarding claim 5, Wattelet et al. teaches a reformer as part of the fuel cell system (column 3 lines 14-37). Further, the combustion exhaust gas heat exchanger is also taught by Wattelet et al. (see above).

It would be desirable to combine the fuel cell and heat exchange system of Dickman et al. in view of Okamoto with the heat exchanger of Wattelet et al. by integrating all of the separated heat exchange systems, for example those of the dehumidification of the various gases required for running the fuel cell in order to increase compactness, reduce cost, and simplify mounting.

Therefore, it would have been obvious to one having ordinary skill in the art to combine the heat exchange system of Wattelet et al. with the system of Dickman et al. in view of Okamoto in order to increase compactness reduce cost, and simplify mounting.

As for claims 2-4, 6, 8-12, and 14, the combination above teaches the heat exchange system but fail to teach the exact arrangement claimed. It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the various heat exchangers to match the claimed arrangement, since it has been held that rearranging parts of an invention involves only routine skill in the art. MPEP 2144 (VI).

6. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dickman et al. in view of Okamoto and Wattelet et al. as applied to claim 1 above, and further in view of Shimanuki et al.

The teachings of Dickman et al., Okamoto, and Wattelet et al. as discussed above are incorporated herein.

Dickman et al., Okamoto, and Wattelet et al. fail to teach second and third heat exchangers for removing moisture from the outlet streams of fuel and air.

Shimanuki et al. teach heat exchangers for eliminating moisture from anode and cathode outlet streams (column 3 lines 1-68; column 4 lines 1-6).

It would be desirable to remove moisture from the outlet streams of the fuel cell system of Dickman et al., Okamoto, and Wattelet et al. as taught by Shimanuki et al.

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since it would help to prevent moisture from condensing and causing interruption in the removal flows of the off-gases of the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to remove moisture from the outlet streams of the fuel cell system of Dickman et al., Okamoto, and Wattlelet et al. as taught by Shimanuki et al. since it would help to prevent moisture from condensing and causing interruption in the removal flows of the off-gases of the fuel cell.

Response to Arguments

7. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new grounds of rejection. Since Applicants' amendment to claim 1 removed the species that was rejected in the Office Action of May 18, 2006, a new rejection was made above for the remaining heat exchanger to remove moisture from the fuel inlet flow.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



SUSY TSANG-FOSTER
PRIMARY EXAMINER

Alix Elizabeth Echelmeyer